

The embryonic development, though in its main lines very uniform throughout the group of the Thoracica (Lepadidæ, Verrucidæ, Balanidæ), shows considerable variation in some respects, and the variable features are the same in all the species.

The most conspicuous variations are those which affect the processes of cell division. The details of the mode of growth of the blastoderm over the yolk, from the appearance of the basal plane to the closure of the blastopore, and the resulting cell arrangements vary indefinitely. After the closure of the blastopore, the yolk endoderm cells present in their mode of division an almost equally great diversity.

The size, shape, and colour of the ova and embryos of a species vary not inconsiderably.

In size and shape the nauplii of a species vary somewhat; but no conspicuous variations occur in structure, the larvæ always showing a great amount of uniformity, even in so minute a feature as the character of each bristle belonging to an appendage. Minute variations occur in the ornamentation of the carapace, caudal spine, and tail, and (in *Chthamalus*) in the number of teeth at the end of the labrum.

XV. "Thermal Radiation in Absolute Measure." By J. T. BOTTOMLEY, M.A., D.Sc., F.R.S. Received June 16, 1892.

(Abstract.)

The paper contains an account of an experimental investigation by the author in continuation of researches on the same subject which have been already published ('Roy. Soc. Proc.,' 1884, and 'Phil. Trans.,' 1887). In the earlier experiments metallic wires heated by an electric current were used. The loss of heat from a heated body, however, depends to some extent on the form and dimensions of the body, and it seemed important to experiment on the loss of heat from bodies differing in form from the wires already used, and larger in dimensions.

Accordingly, two copper globes used by Mr. D. Macfarlane in 1872 ('Roy. Soc. Proc.,' 1872, p. 93) were employed for a new series of experiments.

After preliminary experiments (using the same enclosure which Macfarlane employed, and with the surfaces of Macfarlane's globes prepared in four different ways) new apparatus was constructed; the object being to experiment both with full air pressure and with different amounts of exhaustion of the air, and Macfarlane's enclosure being unsuitable for this purpose.

In the arrangement adopted, the heated globes were hung at the

centre of a hollow metallic sphere, which was connected with the Sprengel pump and surrounded with cold water, and were allowed to cool. The temperature of the cooling globe was read off at equal intervals of time by means of a thermo-electric junction; and from these readings the absolute loss of heat per unit of cooling surface, per unit difference of temperatures of surface and surroundings, per unit of time, is calculated.

The details of the apparatus and method of experimenting are given in the paper. It is enough to say here that the globes were used with their surfaces in two different conditions:—(1) Thinly coated with lamp-black, and (2) silvered and brightly polished; and in both conditions the absolute loss of heat, both in air and in vacuum, more or less complete, was determined. The tables and curves attached to the paper give the details of the results.

To quote one or two examples:—With the sooted surface a total loss of heat by convection and radiation of 3.42×10^{-4} c.g.s. units per square centimetre, per second, per 1° C. of difference of temperatures of globe and surroundings, was observed with a difference of temperatures of 100° C., and with the surroundings at about 14° C. Under similar circumstances the radiation in vacuum of $\frac{1}{2}\text{M}$ (half-a-millionth of atmospheric pressure of non-collapsible gas) was about 1.40×10^{-4} .

Taking a silvered and brightly-polished surface under the same circumstances, the loss in full air was 2.30×10^{-4} c.g.s.; and with the highest vacuum and brightest polish obtained, it was reduced 1.80×10^{-6} with in this case a difference of temperatures of 180° C. The loss with 100° C. difference would be considerably less, but is not known experimentally at present.

The author returns thanks to Mr. James H. Gray, M.A., B.Sc., for excellent assistance given; and expresses himself most deeply indebted, both for assistance in experimenting and calculating of the results, and for most valuable and ingenious aid of various kinds during the course of this work, to his friend Mr. A. Tanakadate, now Professor in Tokio, Japan.

XVI. "The Cerebrum of *Ornithorhynchus paradoxus*." By
ALEX. HILL, M.D. Received June 16, 1892.

(Abstract.)

The brain of *Ornithorhynchus paradoxus* is by no means Avian in type. All its characters are Mammalian, but it presents certain peculiar features which have been overlooked or misunderstood by the anatomists who have hitherto examined it with the naked eye. The most obvious and noteworthy departures from the form of brain